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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/821,411	03/29/2001	Haruo Sunakawa	14463	3677

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EXAMINER

MULPURI, SAVITRI

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 06/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/821,411

Applicant(s)

Sunakawa et al

Examiner

First Last

Art Unit

1234

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on May 27, 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 10-21 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). \_\_\_\_\_ 6) ☐ Other:

Art Unit:

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/27/03 has been entered.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 15-18, 20-21, 10,12,14 are rejected under 35 U.S.C. 102(e) as being anticipated by Tomioka (2001/0000733).

Art Unit:

Tomioka teaches a method of making a compound semiconductor element such as light-emitting diode by the following process steps: providing a growth substrate such as sapphire "10", growing nitride based compound semiconductor layer"31, 32" such as AlGa<sub>N</sub> and InGa<sub>N</sub> on sapphire substrate (see page 1, section 0004); forming protective layer "41" on nitride semiconductor layer for protecting nitride based semiconductor layer (see fig. 5 A-5 C). Tomioka further discloses etching the sapphire with mixture of sulphuric acid and phosphoric acid from the nitride based semiconductor layer, while the nitride based semiconductor layer is being covered with protection layer; removing the protection layer from the nitride based semiconductor layer. Tomioka further discloses flattening second growth layer after the protection layer is removed by polishing and then growing additional nitride based semiconductor layer on polished surface of the nitride based semiconductor layer with great crystallinity(see page 3, section 0042-0045 and 00048-0049) .

***Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit:

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tomioka in combination with Kawai (US 6,239,033).

Tomioka substantially teaches the instant process as stated above. Tomioka teaches etching temperature is about 285 C but does not teach etching at more than 300 C to remove sapphire substrate. Kawai teaches several temperatures in the range of 150 C- 450 C to remove sapphire substrate from the GaN based semiconductor structure (see col. 3, lines 60-63, col.6, lines 50-55). It would have been obvious to one of ordinary skill in the art to use recited temperature in the invention of Tomioka because etching temperature depends on the thickness of sapphire and required etching rate.

Claims 10-11, 13-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Kneissl et al in combination with Kawai et al.

Kneissl et al discloses a method of making GaN based LED structures.; Providing a sapphire substrate '215", growing several device stack layers of AlGaN, InGaN 1110, 1420" (see fig. 14 a- 14b); bonding a protective structure comprising metal substrate '1138" covered with soldering material of Ti/Au on one side and metal contact layer on the other side of the metal substrate, wherein layers "1110, 1138,1422" are similar to recited protective layer (fig. 14 b); removing the sapphire substrate by laser irradiation; after removing the sapphire, processing

Art Unit:

GaN layer surface to Ga material remained on the surface of GaN based stack layers resulted due to removal sapphire ; forming meat contact layer on the GaN based stack layers (see fig 14 c-14 d and related description). Kneissl et al teaches using "1422" as a p-contact electrode, which is similar to the recitation of claim 19.

Kneissl et al teaches laser irradiation to remove sapphire from GaN layers but does not teach removing the substrate by mixture sulphuric and phosphoric acid at a temperature more than 300 C.

Kawai teaches several temperatures in the range of 150 C- 450 C to remove sapphire substrate from the GaN based semiconductor structure (see col. 3, lines 60-63, col.6, lines 50-55) It would have been obvious to one of ordinary skill in the art to remove the sapphire in the invention of Kneissl et al in mixture solution of phosphoric acid and sulphuric acid at 300 C because wet etching as an alternative laser irradiation because wet etching is alternative and art recognized equivalent to laser irradiation to remove the sapphire substrate from GaN based layers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Mulpuri whose telephone number is 703-305-5184. The examiner can normally be reached on Mon-Fri from 8 a.m. to 4.30 p.m..

Art Unit:

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling, can be reached on (703) 3083325. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

  
SAVITRI MULPURI  
PRIMARY EXAMINER